

IN THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the Application:

LISTING OF CLAIMS:

1. (Previously Presented) A data storage system for accessing a set of data, comprising:

a data access manager for establishing a plurality of tokens for accessing the set of data;

a network connection in communication with the data access manager;
and

a data storage assembly in communication with the network connection, the data storage assembly comprising (i) a set of storage locations that stores the set of data, and (ii) a control circuit configured to:

receive from a host in communication with the data access manager over the network connection (i) a device oriented, block based command to access the set of data and (ii) a first access token of the plurality of tokens that provides access to the set of data stored in the set of storage locations in the data storage system;

generate an authorization signal that controls access to the set of data based on the first access token and a second access token of the plurality of tokens, the second access token associated with the set of storage locations, by performing a comparison of the first access token to the second access token associated with the set of storage locations,

if the comparison indicates that the first access token and the second access token are identical, produce an access approval signal that provides access to the set of storage locations; and

if the comparison indicates that the first access token and the second access token are not identical, produce an access

failure signal that indicates a denial of access to the set of storage locations; and

produce a response signal that provides a response to the device oriented, block based command over the network connection to the host based on the authorization signal,

wherein, when receiving, the control circuit is configured to receive from the host in communication with the data access manager over the network connection the first access token of the plurality of tokens that provides access to the set of data stored within a range of disk addresses in the set of storage locations of the data storage assembly, the range of disk addresses distinct from file names associated with the set of data; and

when generating, generate an authorization signal that controls access to the set of data based on the first access token and a second access token of the plurality of tokens, the second access token associated with the range of disk addresses in the set of storage locations.

2. Cancelled

3. (Previously Presented) The data storage system of claim 1, wherein the data access manager comprises a processor and a memory that stores a data access manager application, wherein the processor operates in accordance with instructions of the data access manager application stored in the memory to establish the plurality of tokens for accessing the set of data, and wherein the instructions of the data access manager application configure the processor to:

associate, prior to receiving the first access token, the second access token with the set of storage locations in response to an initial device oriented, block based command from the host to store the set of data;

allocate the set of storage locations in the data storage assembly to receive the set of data in response to the device oriented, block based command to store the set of data, while tagging each storage location with the second

access token; and

provide to the host the set of storage locations and the first access token based on the second access token.

4. (Previously Presented) The data storage system of claim 3, wherein the data access manager application comprises further instructions that configure the processor to:

generate, prior to associating the second access token with the set of storage locations, an initial access token of the plurality of tokens in response to the initial device oriented, block based command to store the set of data in the data storage system;

provide a first copy of the initial access token as the first access token to the host over the network connection; and

provide a second copy of the initial access token as the second access token to the data storage assembly.

5. (Previously Presented) The data storage system of claim 1, wherein the device oriented, block based command is one of a read request to read data from at least one of the set of storage locations and a write request to write data to at least one of the set of storage locations.

6. (Original) The data storage system of claim 1, wherein the network connection is a local area network such that the data storage system forms a storage area network.

7. (Currently Amended) In a data storage system having a set of storage locations, a method for accessing a set of data stored in the set of storage locations, comprising the steps of:

receiving from a host (i) a device oriented, block based command to access the set of data stored in the set of storage locations and (ii) a first access

token that provides access to the set of data stored in the set of storage locations;

generating an authorization signal that controls access to the set of data based on the first access token and a second access token associated with the set of storage locations, by comparing the first access token to the second access token associated with the set of storage locations,

if the comparing step indicates that the first access token and the second access token are identical, producing an access approval signal that provides access to the set of storage locations; and

if the comparing step indicates that the first access token and the second access token are not identical, producing an access failure signal that indicates a denial of access to the set of storage locations; and producing a response signal that provides a response to the device oriented, block based command to the host based on the authorization signal,

wherein, when receiving, receiving from the host the first access token that provides access to the set of data stored within a range of disk addresses in the set of storage locations of the data storage assembly, the range of disk addresses distinct from file names associated with the set of data; and

when generating, generate an authorization signal that controls access to the set of data based on the first access token and the second access token, the second access token associated with the range of disk addresses in the set of storage locations.

8. Cancelled

9. (Previously Presented) The method of claim 7, further comprising the steps of:

prior to the step of receiving the first access token, associating the second access token with the set of storage locations in response to an initial device oriented, block based command from the host to store the set of data;

allocating the set of storage locations in the data storage assembly to receive the set of data in response to the initial device oriented, block based command to store the set of data, while tagging each storage location with the second access token; and

providing to the host the set of storage locations and the first access token based on the second access token.

10. (Previously Presented) The method of claim 9, further comprising the steps of:

prior to the step of associating the second access token with the set of storage locations, generating an initial access token in response to the initial device oriented, block based command to store the set of data in the data storage system; and

providing a first copy of the initial access token as the first access token to the host that initiates the device oriented, block based command; and

providing a second copy of the initial access token as the second access token.

11. (Previously Presented) The method of claim 7, wherein the step of receiving the first access token and the device oriented, block based command comprises receiving one of a read request to read data from at least one of the set of storage locations and a write request to write data to at least one of the set of storage locations.

12. (Original) The method of claim 7, wherein the data storage system is a storage area network comprising a data access manager and at least one data storage assembly comprising storage devices.

13. (Currently Amended) A computer program product that includes a computer readable medium having instructions stored thereon for accessing a

-7-

set of data, such that the instructions, when carried out by a data storage system having a set of storage locations storing the set of data, cause the data storage system to perform the steps of:

receiving from a host (i) a device oriented, block based command to access the set of data stored in the set of storage locations and (ii) a first access token that provides access to the set of data stored in the set of storage locations;

generating an authorization signal that controls access to the set of data based on the first access token and a second access token associated with the set of storage locations, by comparing the first access token to the second access token associated with the set of storage locations,

if the comparing step indicates that the first access token and the second access token are identical, producing an access approval signal that provides access to the set of storage locations; and

if the comparing step indicates that the first access token and the second access token are not identical, producing an access failure signal that indicates a denial of access to the set of storage locations; and produce a response signal that provides a response to the device oriented, block based command to the host based on the authorization signal,

wherein, when receiving, receiving from the host the first access token that provides access to the set of data stored within a range of disk addresses in the set of storage locations of the data storage assembly, the range of disk addresses distinct from file names associated with the set of data; and

when generating, generating an authorization signal that controls access to the set of data based on the first access token and the second access token, the second access token associated with the range of disk addresses in the set of storage locations.

14. (Currently Amended) A data storage assembly for accessing a set of data, comprising:

a set of storage locations that stores the set of data; and
a control circuit in communication with the set of storage locations, the control circuit configured to:

receive from a host in communication with the control circuit over a network connection (i) a device oriented, block based command to access the set of data and (ii) a first access token that provides access to the set of data stored in the set of storage locations;

generate an authorization signal that controls access to the set of data based on the first access token and a second access token associated with the set of storage locations, by comparing the first access token to the second access token associated with the set of storage locations,

if the comparison indicates that the first access token and the second access token are identical, produce an access approval signal that provides access to the set of storage locations; and

if the comparison indicates that the first access token and the second access token are not identical, produce an access failure signal that indicates a denial of access to the set of storage locations; and
produce a response signal that provides a response to the device oriented, block based command over the network connection to the host based on the authorization signal,

wherein, when receiving, the control circuit is configured to receive from the host in communication with a data access manager over the network connection the first access token that provides access to the set of data stored within a range of disk addresses in the set of storage locations of the data storage assembly, the range of disk addresses distinct from file names associated with the set of data; and

when generating, generate an authorization signal that controls access to the set of data based on the first access token and the second access token, the second access token associated with the range of disk addresses in the set of storage locations.

15. Cancelled

16. (Previously Presented) The data storage assembly of claim 14, wherein the device oriented, block based command is one of a read request to read data from at least one of the set of storage locations and a write request to write data to at least one of the set of storage locations.

17. (Currently Amended) In a data storage assembly having a set of storage locations, a method for accessing a set of data stored in the set of storage locations, comprising the steps of:

receiving from a host (i) a device oriented, block based command to access the set of data stored in the set of storage locations and (ii) a first access token that provides access to the set of data stored in the set of storage locations;

generating an authorization signal that controls access to the set of data based on the first access token and a second access token associated with the set of storage locations, by comparing the first access token to the second access token associated with the set of storage locations,

if the comparing step indicates that the first access token and the second access token are identical, producing an access approval signal that provides access to the set of storage locations; and

if the comparing step indicates that the first access token and the second access token are not identical, producing an access failure signal that indicates a denial of access to the set of storage locations; and producing a response signal that provides a response to the device oriented, block based command to the host based on the authorization signal,

wherein, when receiving, receiving from the host the first access token of the plurality of tokens that provides access to the set of data stored within a range of disk addresses in the set of storage locations of the data storage

assembly, the range of disk addresses distinct from file names associated with the set of data; and

when generating, generate an authorization signal that controls access to the set of data based on the first access token and the second access token, the second access token associated with the range of disk addresses in the set of storage locations.

18. Cancelled

19. (Previously Presented) The method of claim 17, wherein the step of receiving the first access token and the device oriented, block based command comprises receiving one of a read request to read data from at least one of the set of storage locations and a write request to write data to at least one of the set of storage locations.

20. (Previously Presented) A computer program product that includes a computer readable medium having instructions stored thereon for accessing a set of data, such that the instructions, when carried out by a data storage assembly having a set of storage locations that store the set of data, cause the data storage assembly to perform the steps of:

receiving from a host (i) a device oriented, block based command to access the set of data stored in the set of storage locations and (ii) a first access token that provides access to the set of data stored in the set of storage locations;

generating an authorization signal that controls access to the set of data based on the first access token and a second access token associated with the set of storage locations, by comparing the first access token to the second access token associated with the set of storage locations,

if the comparing step indicates that the first access token and the second access token are identical, producing an access approval signal

that provides access to the set of storage locations; and

if the comparing step indicates that the first access token and the second access token are not identical, producing an access failure signal that indicates a denial of access to the set of storage locations; and producing a response signal that provides a response to the device oriented, block based command to the host based on the authorization signal, wherein, when receiving, receiving from the host the first access token of the plurality of tokens that provides access to the set of data stored within a range of disk addresses in the set of storage locations of the data storage assembly, the range of disk addresses distinct from file names associated with the set of data; and

when generating, generate an authorization signal that controls access to the set of data based on the first access token and the second access token, the second access token associated with the range of disk addresses in the set of storage locations.

21. - 25. Cancelled

26. (Currently Amended) A data access system for providing access to a set of data, comprising:

a host comprising (i) a memory having a host application, (ii) an input/output controller, and (iii) a processor in communication with the memory and the input/output controller, wherein the processor operates in accordance with instructions of the host application stored in the memory to request access to the set of data;

a network connection in communication with the host; and

a data storage assembly in communication with the network connection, the data storage assembly comprising (i) a set of storage locations that stores the set of data, and (ii) a control circuit, wherein:

the processor of the host operates in accordance with the host application to provide to the data storage assembly through the input/output controller of the host and the network connection (i) a device oriented, block based command to access the set of data and (ii) a first access token of a plurality of tokens that provides access to the set of data stored in the set of storage locations in the data storage assembly;

the control circuit of the data storage assembly is configured to receive over the network connection (i) the device oriented, block based command to access the set of data and (ii) the first access token provided by the host;

the control circuit is configured to generate, in response to receiving the device oriented, block based command and the first access token, an authorization signal that controls access to the set of data based on the first access token and a second access token of the plurality of tokens, the second access token associated with the set of storage locations, by comparing the first access token to the second access token associated with the set of storage locations,

if the comparing step indicates that the first access token and the second access token are identical, producing an access approval signal that provides access to the set of storage locations; and

if the comparing step indicates that the first access token and the second access token are not identical, producing an access failure signal that indicates a denial of access to the set of storage locations; and

the control circuit is configured to produce a response signal that provides a response to the device oriented, block based command over the network connection to the host based on the authorization signal,

wherein, when receiving, the control circuit is configured to receive from the host over the network connection the first access token of the plurality of tokens that provides access to the set of data stored within a range of disk addresses in the set of storage locations of the data storage assembly, the range of disk addresses distinct from file names associated with the set of data; and

when generating, generate an authorization signal that controls access to the set of data based on the first access token and the second access token of the plurality of tokens, the second access token associated with the range of disk addresses in the set of storage locations.

27. (Previously Presented) The data access system of claim 1, further comprising a data access manager in communication with the network connection, the data access manager comprising a processor and a memory that stores a data access manager application, wherein the processor operates in accordance with instructions of the data access manager application stored in the memory to establish the plurality of tokens for accessing the set of data, and wherein the instructions of the data access manager application configure the processor to:

associate, prior to receiving the first access token, the second access token with the set of storage locations in response to an initial device oriented, block based command from the host to store the set of data;

allocate the set of storage locations in the data storage assembly to receive the set of data in response to the initial device oriented, block based command to store the set of data, while tagging each storage location with the second access token; and

provide to the host the set of storage locations and the first access token based on the second access token.

28. (Currently Amended) In a data access system having a host and a data storage assembly having a set of storage locations, a method for providing access to a set of data stored in the set of storage locations, comprising the steps of:

providing to the data storage assembly from the host (i) a device oriented, block based command to access the set of data and (ii) a first access token of a plurality of tokens that provides access to the set of data stored in the set of

storage locations in the data storage assembly;

generating, in response to receiving the device oriented, block based command and the first access token, an authorization signal that controls access to the set of data based on the first access token and a second access token of the plurality of tokens, the second access token associated with the set of storage locations, by comparing the first access token to the second access token associated with the set of storage locations,

if the comparing step indicates that the first access token and the second access token are identical, producing an access approval signal that provides access to the set of storage locations; and

if the comparing step indicates that the first access token and the second access token are not identical, producing an access failure signal that indicates a denial of access to the set of storage locations; and producing a response signal that provides a response to the device oriented, block based command from the data storage assembly to the host based on the authorization signal,

wherein, when receiving, receiving from the host the first access token of the plurality of tokens that provides access to the set of data stored within a range of disk addresses in the set of storage locations of the data storage assembly, the range of disk addresses distinct from file names associated with the set of data; and

when generating, generate an authorization signal that controls access to the set of data based on the first access token and the second access token of the plurality of tokens, the second access token associated with the range of disk addresses in the set of storage locations.

29. (Previously Presented) The method of claim 28, wherein the data access system further comprises a data access manager, and the method further comprises the steps of:

associating, prior to receiving the first access token, the second access

token with the set of storage locations in response to an initial device oriented, block based command from the host to the data access manager to store the set of data;

allocating the set of storage locations in the data storage assembly to receive the set of data in response to the initial device oriented, block based command to store the set of data, while tagging each storage location with the second access token; and

providing to the host from the data access manager the set of storage locations and the first access token based on the second access token.

30. Cancelled

31. (Previously Presented) The data storage system of claim 1 wherein the device oriented, block based command comprises a SCSI command, the control circuit is configured to receive the SCSI command via non-channel communications using a transport protocol.

32. - 34. Cancelled

35. (Currently Amended) A data storage system for accessing a set of data, comprising:

a data access manager for establishing a plurality of tokens for accessing the set of data;

a network connection in communication with the data access manager;
and

a data storage assembly in communication with the network connection, the data storage assembly comprising (i) a set of storage locations that stores the set of data, and (ii) a control circuit configured to:

receive from a host in communication with the data access manager over the network connection (i) a device oriented, block based

command to access the set of data and (ii) a first access token of the plurality of tokens that provides access to the set of storage locations within a range of disk addresses in the set of storage locations in the data storage system, the range of disk addresses distinct from file names associated with the set of data;

generate an authorization signal that controls access to the set of storage locations based on the first access token and a second access token of the plurality of tokens, the second access token associated with the range of disk addresses in the set of storage locations; and

produce a response signal that provides a response to the device oriented, block based command over the network connection to the host based on the authorization signal,

wherein, when receiving, the control circuit is configured to receive from the host in communication with the data access manager over the network connection the first access token of the plurality of tokens that provides access to the set of data stored within a range of disk addresses in the set of storage locations of the data storage assembly, the range of disk addresses distinct from file names associated with the set of data; and

when generating, generate an authorization signal that controls access to the set of data based on the first access token and the second access token of the plurality of tokens, the second access token associated with the range of disk addresses in the set of storage locations.

36. (Previously Presented) The data storage system of claim 1 wherein:
the set of storage locations of the data storage assembly comprises a range of disk addresses that stores the set of data, the control circuit configured to:

receive from the host in communication with the data access manager over the network connection (i) the device oriented, block based command to access the set of data and (ii) a first access token of the

plurality of tokens that provides access to the set of data stored in the range of disk addresses;

generate the authorization signal that controls access to the set of data based on the first access token and a second access token of the plurality of tokens, the second access token associated with the set of storage locations, by performing a comparison of the first access token to the second access token associated with the set of storage locations,

if the comparison indicates that the first access token and the second access token are identical, produce the access approval signal that provides access to the range of disk addresses; and

if the comparison indicates that the first access token and the second access token are not identical, produce the access failure signal that indicates a denial of access to the range of disk addresses.

37. (Previously Presented) The data storage system of claim 1 wherein the control circuit is configured to receive, from the host, the device oriented, block based command to access the set of data and wherein the device oriented, block based command comprises one or more ranges of disk addresses of the set of storage locations.

38. (Previously Presented) The method of claim 7 wherein receiving from the host the device oriented, block based command comprises receiving from the host the device oriented, block based command having one or more ranges of disk addresses of the set of storage locations.

39. (Previously Presented) The computer program product of claim 13 wherein receiving from the host the device oriented, block based command to access the set of data stored in the set of storage locations comprises receiving

from the host one or more ranges of disk addresses of the set of storage locations to access the set of data stored in the set of storage locations.

40. (Previously Presented) A data storage system for accessing a set of data, comprising:

- a data access manager for establishing a plurality of tokens for accessing the set of data;

- a network connection in communication with the data access manager;
- and

- a data storage assembly in communication with the network connection, the data storage assembly comprising (i) a set of storage locations having a range of disk addresses that stores the set of data, and (ii) a control circuit configured to:

- receive from the host in communication with the data access manager over the network connection (i) a device oriented, block based command to access the set of data, the device oriented, block based command comprising one or more ranges of disk addresses of the set of storage locations and (ii) a first access token of the plurality of tokens that provides access to the set of data stored in the range of disk addresses;

- generate an authorization signal that controls access to the set of data based on the first access token and a second access token of the plurality of tokens, the second access token associated with the set of storage locations, by performing a comparison of the first access token to the second access token associated with the set of storage locations;

- if the comparison indicates that the first access token and the second access token are identical, produce an access approval signal that provides access to the set of storage locations; and

- if the comparison indicates that the first access token and the second access token are not identical, produce an access

failure signal that indicates a denial of access to the set of storage locations; and

produce a response signal that provides a response to the device oriented, block based command over the network connection to the host based on the authorization signal;

wherein the device oriented, block based command comprises a SCSI command and the control circuit is configured to receive the SCSI command via non-channel communications using a transport protocol,

wherein, when receiving, the control circuit is configured to receive from the host in communication with the data access manager over the network connection the first access token of the plurality of tokens that provides access to the set of data stored within a range of disk addresses in the set of storage locations of the data storage assembly, the range of disk addresses distinct from file names associated with the set of data; and

when generating, generate an authorization signal that controls access to the set of data based on the first access token and the second access token of the plurality of tokens, the second access token associated with the range of disk addresses in the set of storage locations.